

REMARKS

Reconsideration and allowance of the subject application are respectfully requested.

Claims 1 and 6-8 are pending in this application. Claims 2-4 are newly cancelled and claim 5 was previously cancelled. Claims 6-8 are newly added and are transitional with respect to R⁷ and R⁸. Claim 1 has been amended to:

- 1) recite Y1, Y2 and Y3 to be a hydrogen atom;
- 2) recite R⁷ and R⁸ to be a hydrogen atom, C₁₋₆ alkyl group, phenyl group or substituted phenyl group; and
- 3) recite X to be an iodine atom.

No new matter has been added.

The applicant's undersigned patent counsel wishes to express his appreciation to Examiner Valenrod for the courtesy extended during the interview of November 24, 2009. During the interview, the rejection of claims 1-4 under 35 USC 103(a) over Kodama et al. (EP 1,277,726A1) in view of Harayama et al. (US 2004/0116299A1) was discussed based upon the proposed Amendment and Rule 132 Declaration. It is sincerely believed that the interview materially advanced prosecution of this application. The above noted new claims and claim revisions are believed to be commensurate with the discussions during the interview.

The applicant respectfully traverses the rejection of claims 1-4 under 35 USC 103(a) over Kodama et al. (EP 1,277,726A1) in view of Harayama et al. (US 2004/0116299A1). These references do not make the presently claimed invention to be obvious.

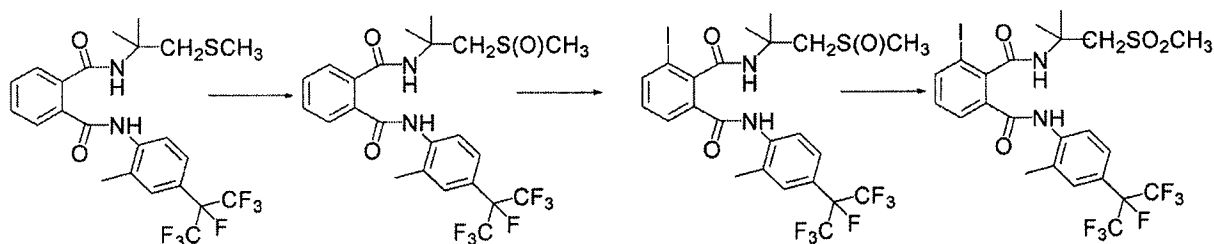
Please refer to the amendment of claim 1, as shown above, which has reduced the scope of the presently claimed invention.

The applicant submits a new Rule 132 Declaration with this Amendment which clearly demonstrates new and unexpected results, which would be unpredictable in view of the prior art, based upon the results of side-by-side comparative experiments with the closest processes of the cited prior art references. The results of the Declaration will be discussed below.

Upon initial consideration, the presently claimed process may appear inefficient because the process comprises two oxidation steps. However, as disclosed in the present application and as again shown in the present Rule 132 Declaration, the yield of the presently claimed process is unexpectedly and unpredictably superior compared with the processes that would result from combining the teachings of the prior art, such as Kodama and Harayama in the present rejection.

The presently claimed method recites a method which comprises the steps of introducing a halogen atom in o-position of the benzene nucleus of the sulfoxide (II) to obtain halogenated sulfoxide (III) and then oxidizing the halogenated sulfoxide (III) to sulfone (I). This is shown by the following:

Sulfide → Sulfoxide → Halogenated sulfoxide → Halogenated sulfone .



In contrast, Harayama discloses a production route in which a sulfide is oxidized to sulfone [i.e., sulfide → sulfone], and Kodama discloses a method of introducing a halogen atom into o-position of the benzene nucleus of a sulfide or sulfoxide [sulfide or sulfoxide → halogenated sulfide or sulfoxide].

The applicant has carefully considered the present rejection and strongly assert that Harayama fails to disclose the route of oxidizing sulfoxide to form sulfone.

Regarding the scheme at page 2 of Harayama, please note that compound (VI) should have been “compound (IV)” to compound (I).

The scheme disclosed at page 2 of Harayama specifically discloses only the route of oxidizing sulfide directly to form sulfone (see Example 3, at [0040]-[0041]). Thus, Harayama is substantially silent about the route of oxidizing sulfoxide to form sulfone, which is the second step of the presently claimed process for producing the desired compound of formula (I).

Further, the specifically disclosed yield of the compound having 2 as “n” in Harayama, Example 3, is only 74%, which is significantly lower than those yields achieved by the presently claimed process. The present specification discloses that the yields were 82%, 81%, 83%, 87%, 87%, 88%, 83% and 83% in Examples 1-8, respectively. The yield of the compound of the presently claimed process, as demonstrated in the attached Rule 132 Declaration (discussed in detail, below), was 84% and this yield was also significantly higher than that achieved by the prior art. From these amassed data, a person of ordinary skill in the art would confidently assert

the new, unexpected and unpredicted results of the presently claimed invention.

Additionally, the applicant points out that Harayama only insinuates formalistically and schematically the route $\text{SO} \rightarrow \text{SO}_2$ and fails to disclose or suggest any examples thereof, whatsoever.

In order to obtain the halogenated sulfone (I) from sulfide, a person of ordinary skill in the art would therefore be motivated by the teaching of Harayama to oxidize sulfide to form sulfone to carry out halogenation with Pd thereafter, or to halogenate sulfide with Pd to conduct oxidization thereafter.

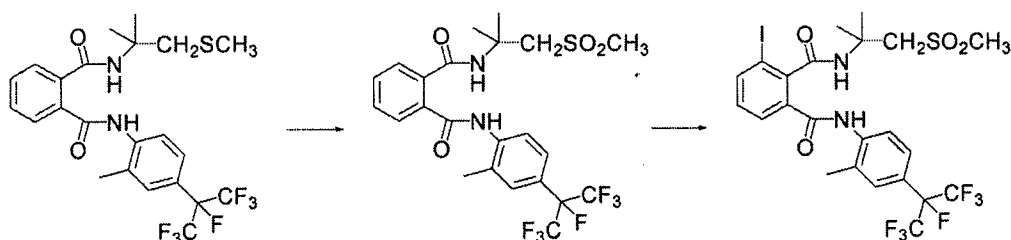
In contrast, the presently claimed process requires the two-step oxidization with an intermediary production of sulfoxide in between sulfide and sulfone. There is no teaching, suggestion, or motivation in the Harayama nor Kodama that would have led one of ordinary skill to modify the cited references or to combine their teachings to arrive at the presently claimed process. Nor would it have been "obvious to try" by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.

The two-step oxidization of the presently claimed process is not obvious from the disclosure in Harayama. The applicant asserts that the present rejection can only result from hind-sight based upon the presently claimed invention and not result from teachings of Harayama and Kodama.

Upon consulting Kodama and Harayama, a person of ordinary skill in the art would have been motivated to try a route comprising oxidizing a sulfide to the corresponding sulfone and halogenating the sulfone with Pd catalyst to obtain the

halogenated sulfone. This is shown by the following (referred to herein as "Route 3"):

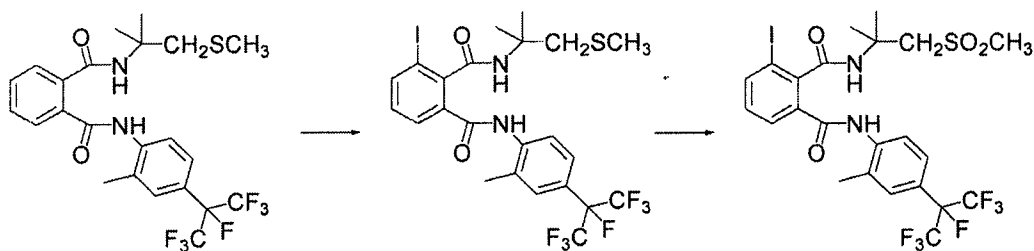
Route 3 Sulfide → Sulfone → Halogenated sulfone



Alternatively, the skilled person in the art would have been motivated to try a route comprising halogenating a sulfide with Pd catalyst to obtain the corresponding halogenated sulfide and oxidizing the halogenated sulfide to the halogenated sulfone.

This is shown by the following (referred to herein as "Route 2"):

Route 2 Sulfide → Halogenated sulfide → Halogenated sulfone



However, one of ordinary skill in the art would not have found any disclosure or suggestion, nor have been motivated, to try to make a halogenated sulfone through the presently claimed route, because the route is significantly different in that it is an indirect route via sulfoxide with two steps of oxidation.

As noted above, the applicant has performed new experiments, set forth in the attached Rule 132 Declaration, which demonstrate new, unexpected and entirely

unpredictable superior results of the presently claimed process compared to the processes of Kodama and Harayama, combined pursuant to the present Office Action.

The Examiner is asked to carefully review the attached Rule 132 Declaration.

In the Declaration, experiments were performed to shown a representative yield of a 2-halogenobenzamide compound obtained from the presently claimed process (Experiment 1, shown by Route 1) compared with the two routes derivable from the prior art employing the identical starting material and reaction conditions, i.e. Experiment 2 and Experiment 3, respectively shown by Route 2 and Route 3, which are discussed and shown above.

The results of the Experiments 1, 2 and 3 are shown in the table on the last page of the Declaration. The side-by-side experimental results show the process of the presently claimed invention to achieve a far higher yield of the target compound compared with the two comparative processes derived from the combined prior art references. The yield from the presently claimed process (Experiment 1) was 84% compared to the prior art Experiment 2 yield of 25% and the prior art Experiment 3 yield of 0%.

The applicant submits that Rule 132 Declaration, demonstrates new, unexpected and entirely unpredictable superior results of the presently claimed process compared to the processes of Kodama and Harayama.

The presently claimed invention is fully allowable under 35 USC 103(a) in view of the prior art.

The applicant continues to assert the new and unexpected results of the presently claimed process based upon the side-by-side comparative experiments set

forth in the Rule 132 Declaration filed June 26, 2008. Unexpectedly, the route of the presently claimed process has achieved significant reduction of the required amount of Pd catalyst and improvement of the yield of the final product by detouring sulfoxides (II) and (III).

The experimental results shown in the June 26th Declaration clearly show a profound reduction (over 300% reduction) of the required amount of Pd catalyst and improvement in the yield of the final product. This has been achieved by the route according to the presently claimed invention which uses a sulfoxide as the starting material.

The comparative, experimental results set forth in the June 26, 2008, Rule 132 Declaration demonstrate new, unexpected and entirely unpredictable results of the presently claimed process. The presently claimed invention is fully allowable under Section 103(a) over the prior art references.

Thus, the applicant submits that a person of ordinary skill in the art would not have been led to the presently claimed invention in view of Kodama and Harayama. The presently claimed invention is fully allowable under Section 103(a) in view of the prior art.

The applicant respectfully traverses the rejection of claims 1-4 on the ground of nonstatutory obviousness-type double patenting over claims 1 and 4 of US 7,057,067 (US '067) in view of Harayama et al. These references do not make the presently claimed invention to be obvious.

The applicant has discussed the teachings of Harayama et al. above and thoroughly distinguished the presently claimed process from the teachings of

Harayama. The applicant again notes the present amendment of claim 1 as shown above.

The claims 1 and 4 of US '067 fail to disclose or suggest the step in the presently claimed method of oxidation of a halogenated sulfoxide. Accordingly, the presently claimed process significantly differs from the subject matter of claims 1 and 4 of US '067, and is certainly not obvious in view of the cited US '067 claims.

The teachings of Harayama do not remedy the deficiencies of US '067 claims 1 and 4. Harayama discloses the step of oxidizing a sulfide directly to form sulfone, it neither discloses nor suggests the second step of the presently claimed invention of oxidizing a halogenated sulfoxide to a sulfone. Accordingly, the combined teachings of the US '067 claims and Harayama do not make the presently claimed invention to be obvious.

Moreover, the applicant submits that a person of ordinary skill in the art would not be led to combine the teachings of Harayama with the US '067 claims 1 and 4. There is no suggestion or motivation to combine the two references because of the significant disparity in their teachings. The applicant asserts that the combination of US '067 claims 1 and 4, plus Harayama is not tenable and should accordingly be withdrawn.

Even if the combined teachings of the US '067 claims 1 and 4, plus Harayama were considered, then such combination would not make the presently claimed method to be obvious for the reasons discussed above.

The presently claimed invention is no where disclosed, suggested or made obvious by the combination of US '067 claims 1 and 4, plus Harayama. The presently claimed invention is fully allowable over the cited references.

In view of the above remarks, the Rule 132 Declaration filed June 26, 2008, and the attached new Rule 132 Declaration, it is believed that this application is in condition for allowance and a Notice to that effect is respectfully requested.

Respectfully submitted,

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